(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 851 207 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.03.2015 Bulletin 2015/13

(51) Int Cl.:
B42D 25/00 *(2014.01)* ***B41J 11/46*** *(2006.01)*

(21) Application number: **13178094.2**

(22) Date of filing: **25.07.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) Personalization of documents

(57) A printing system (102) for pre-personalizing a document is described. The printing system (102) comprises a printing device (104) to print a matrix comprising a plurality of categories of sub-pixels. The printing device (104) further prints a plurality of categories of positioning marks. Further, each category of positioning marks is associated with a respective category of sub-pixels.

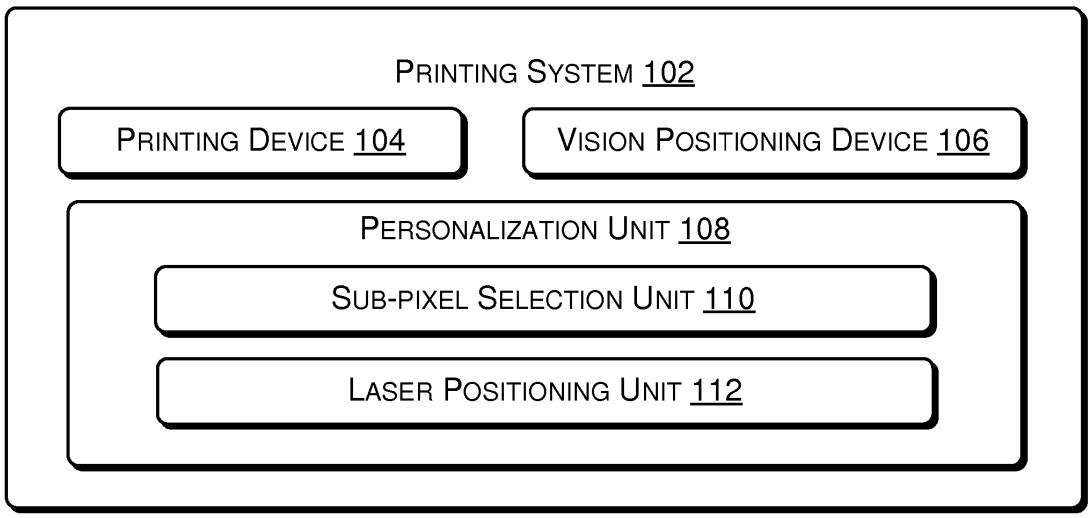

Figure 1

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Description

FIELD OF INVENTION

[0001] The present subject matter relates, in general, to personalization of documents and, in particular to, a system and a method for personalization of documents by laser marking.

BACKGROUND

[0002] Documents, such as identification cards, passports, credit cards, banking cards, driving licenses, etc., play a critical role in today's society. These documents carry data related to the identity of a holder. For example, such documents may carry name, address, birth date, signature and/or photographic image of the holder. These documents are used on a daily basis to prove identity, to verify age, to access a secure area and for other similar purposes. Because of the sensitivity and importance associated with the data carried by such documents, they are often subjected to unauthorized copying, alterations, and counterfeiting. To prevent such activities, various techniques are available for enhancing security of these documents. One such technique is laser marking. Laser marking is a technique for securely and efficiently personalizing the documents by permanently marking personal data, such as date codes, bar codes, signatures, photographic images, and ghost images, on such documents using high powered laser pulses.

SUMMARY

[0003] This summary is provided to introduce concepts related to personalization of documents. This summary is not intended to identify essential features of the claimed subject matter nor is it intended for use in determining or limiting the scope of the claimed subject matter.

[0004] In one embodiment of the present subject matter, a document comprising a pre-printed matrix of a plurality of categories of sub-pixels for personalizing the document with a personal data is disclosed. The pre-printed matrix further comprises a plurality of categories of positioning marks. Each category of positioning marks is associated with a respective category of sub-pixels.

[0005] In one embodiment of the present subject matter, a printing system for pre-personalizing a document is described. The printing system comprises a printing device to print a matrix comprising a plurality of categories of sub-pixels. The printing device further prints a plurality of categories of positioning marks. Further, each category of positioning marks is associated with a respective category of sub-pixels.

[0006] In one embodiment of the present subject matter, a method for creating a pre-personalized document is disclosed. The method comprises printing a plurality of categories of sub-pixels on a document. The method further comprises printing a plurality of categories of positioning marks on the document to create the pre-personalized document. Each category of positioning marks is associated with a respective category of sub-pixels.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The detailed description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the drawings to reference like features and components. It should be appreciated by those skilled in the art that any block diagrams herein represent conceptual views of illustrative systems embodying the principles of the present subject matter.

[0008] Figure 1 schematically illustrates a printing system for personalizing documents, in accordance with an embodiment of the present subject matter.

[0009] Figure 2 illustrates an exemplary matrix of three categories of sub-pixels and three categories of positioning marks printed in proximity to the matrix, in accordance with an embodiment of the present subject matter.

[0010] Figures 3a illustrates an exemplary matrix used for personalizing a document by a conventional system.

[0011] Figure 3b illustrates an exemplary matrix used for personalizing the document by present printing system.

[0012] Figures 4a and 4b illustrate a method for creating a pre-personalized document and for personalizing the pre-personalized document, in accordance with an embodiment of the present subject matter.

DESCRIPTION OF EMBODIMENTS

[0013] Conventionally, various techniques and methods are available for personalization of documents. One such technique is laser marking, which is used for personalization of documents, such as identification cards, passports, and credit cards. According to the laser marking technique, the document can be personalized by marking personal data say, one or more of a name, a signature, an image, for example, a photograph, alpha numerical data, a fingerprint, and graphical elements, on the document using laser pulses.

[0014] For example, to print or mark a photograph on a document, a matrix of a plurality of differently colored sub-pixels is used. In an example, the matrix can include sub-pixels of red, blue, and green color. Such a matrix can be printed on the document. Typically, for printing a matrix of sub-pixels of red, blue, and green color, a printer is loaded with three plates, one for each color, and the plates are aligned so as to produce the matrix of sub-pixels.

[0015] During personalization of the document, certain sub-pixels in the matrix are selected based on the pattern of the photograph. Laser beams or laser pulses are then positioned over the selected sub-pixels to mark or print

the photograph on the document. Conventionally, the laser pulses are concentrated or positioned using a positioning mark of only one color based on the known alignment of the plates. For example, the positioning mark can be of any one of a red color, a blue color or a green color, and using this positioning mark of one color laser pulses are concentrated on the selected sub-pixels of all the three colors. As a result, the selected sub-pixels become dark and create the desired contrast and number of gray levels to allow creation of the photographic image. However, since three plates of different colors are used to print the matrix on the document, some misalignment can occur between the sub-pixels of these colors. For example, when small objects, spaced 10 microns are printed on a document, spacing between each color may not be the same and this results in a color imbalance. Further, during personalization of the document, since positioning mark of only one color is used to darken all the selected sub-pixels, the sub-pixels would not be correctly darkened or covered due to misalignment between the colors, hence resulting in a false color rendering.

[0016] In accordance with the present subject matter, a system and a method for personalizing documents is disclosed. The documents referred herein may include identity cards, passports, driving licenses, credit cards, and banking cards. Such documents may be created on a polycarbonate substrate, a polyethylene terephthalate (PET) substrate, a polyvinyl chloride (PVC) substrate and a laminated substrate.

[0017] For personalizing a document, a matrix of a plurality of categories of sub-pixels is used. Each of the plurality of categories of sub-pixels is indicative of a unique color. Further, each of the plurality of categories of sub-pixels includes a plurality of sub-pixels. In one implementation, the plurality of categories of sub-pixels may be indicative of a color combination of at least three colors. In one example, the color combination may be a Red-Green-Blue (RGB) color combination. In another example, the color combination may be a Yellow-Magenta-Cyan (YMC) color combination. For instance, the matrix can include three categories of sub-pixels, such that first category of sub-pixels is indicative of a cyan color, i.e, the sub-pixels of that category are of cyan color, second category of sub-pixels is indicative of a yellow color, and third category of sub-pixels is indicative of a magenta color. Further, the shape of the sub-pixels may be in form of dots, lines, or any other shape. In one implementation, the matrix may be printed on a printable surface of the document. In an example, the printable surface may be a layer, say, a bottom layer or an intermediate layer of the document. In an example, design of the matrix to be printed can be prepared using a known computer-aided design (CAD) technique.

[0018] In one implementation, a plurality of categories of positioning marks is also printed in proximity to the matrix. Each of the plurality of categories of the positioning marks is of a different color. Further, each category of positioning marks may include one or more positioning marks. In said implementation, each category of positioning marks is associated with a respective category of sub-pixels. For instance, if a matrix includes three categories of sub-pixels of cyan, yellow, and magenta color, respectively, then three categories of positioning marks, one for each color, are printed near one or more corners of the matrix. For example, for a category of sub-pixels of cyan color, a positioning mark of cyan color is printed in proximity of a corner of the matrix, and another positioning mark of cyan color may also be printed in proximity of another corner of the matrix and so on.

[0019] Although, it has been described that the plurality of categories of positioning marks are printed in proximity to the matrix, i.e., outside the matrix, however, in another implementation, the plurality of categories of positioning marks may be printed inside the matrix, such that the matrix comprises the plurality of categories of sub-pixels and the plurality of categories of positioning marks.

[0020] The plurality of categories of positioning marks may be represented by different shapes including a cross shape, a T-shape, a bar shape, and a target shape. In an implementation, the pattern or the shape of each category of positioning marks may be different for different colors. These categories of positioning marks are used for locating the categories of sub-pixels and positioning laser pulses on the categories of sub-pixels. For example, a category of sub-pixels of a color can be located with the help of category of positioning marks representative of that color. The matrix and the plurality of categories of positioning marks may be printed using a conventional printing system, such as an offset lithography printing system or a silk screen printing system.

[0021] According to an implementation of the present subject matter, a pre-personalized document is created based on printing the plurality of categories of sub-pixels and the plurality of categories of the positioning marks, associated with the plurality of categories of sub-pixels, on the document. Initially, a plurality of printing plates is prepared, one for each category of sub-pixels and each category of positioning marks, associated with the category of sub-pixels. For instance, first printing plate is prepared for a first category of sub-pixels and a first category of positioning marks, associated with the first category of sub-pixels. In an implementation, if color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the category of sub-pixels. Similarly, second printing plate is prepared for a second category of sub-pixels and a second category of positioning marks, and so on. In one implementation, the plurality of printing plates is loaded into the printing system.

[0022] Thereafter, the plurality of printing plates are positioned, one by one, on the document to print each category of sub-pixels and each category of positioning marks with the corresponding category of sub-pixels to create the pre-personalized document. In one implementation, the printing plates are aligned at a pre-defined gap, corresponding to the gap between two sub pixels.

Further, the plurality of categories of sub-pixels and the plurality of categories of positioning marks are printed with a level of tolerance substantially ranging from 10 to 50 microns.

[0023] In one implementation, the matrix and the plurality of categories of positioning marks may be pre-printed on a printable surface of the document. In another implementation, the matrix and the plurality of categories of positioning marks may be printed inside a substrate of the document, i.e., in one of printable layers of the substrate. The manner in which the personalization of document using the above described matrix takes place is described henceforth.

[0024] Initially, a personal data that is to be printed or marked on the document is obtained from a user. The personal data comprises a representation of the user. The representation of the user may be a name, a photograph, a signature, an image, such as a photograph, etc. The personal data can be made in a Bitmap (BMP) file format or in a Joint Photographic Experts Group (JPEG) file format, or any image file format. To accurately print the personal data on the document, the personal data should appropriately overlap the matrix to generate desired color effects and the personal data.

[0025] Based on the personal data, a plurality of sub-pixels from each of the plurality of categories of sub-pixels is selected from the matrix. In one implementation, the plurality of sub-pixels from each category of sub-pixels is selected one by one, based on the personal data. For instance, a plurality of sub-pixels from a category of sub-pixels that is indicative of cyan color is selected first. Thereafter, a plurality of sub-pixels from a category of sub-pixels that is indicative of yellow color is selected and finally a plurality of sub-pixels from a category of sub-pixels indicative of magenta color is selected.

[0026] Further, one or more laser pulses, say laser pulses of known Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) laser or a carbon dioxide (CO_2) laser, are positioned over the selected plurality of sub-pixels of the category of sub-pixels. To accurately position the laser pulses over the selected plurality of sub-pixels of the category of sub-pixels, a vision positioning device is used. The vision positioning device includes a camera to capture a category of positioning marks that is associated with the selected plurality of sub-pixels of the category of sub-pixels. For instance, if the plurality of sub-pixels is selected from a category of sub-pixels that is indicative of cyan color, then the vision positioning device captures the category of positioning marks that represents cyan color for precise placement of the laser pulses over the selected plurality of sub-pixels. The plurality of categories of positioning marks assists in positioning one or more laser pulses on the selected sub-pixels of each of the categories of sub-pixels.

[0027] When the laser pulses are positioned on the selected sub-pixels of each of the categories of sub-pixels, the laser shots appropriately darken the selected sub-pixels based on the personal data to be printed. As described earlier, the document may be created on the polycarbonate substrate. Since the documents made of polycarbonate material are laser reactive, the carbon particles react and turn black when exposed to the laser pulse. In an example, laser pulses of range 1064 nm can be positioned over the selected sub-pixels of the categories of sub-pixels to darken them. The sub-pixels of the matrix that are not blackened are perceived as sub-pixels of a new color. For instance, in a matrix of cyan, yellow, and magenta colored sub-pixels, if the laser pulses are positioned over the sub-pixels of cyan color, then the sub-pixels of cyan color turn black. The remaining colors in the matrix, i.e., yellow, magenta, and black are perceived as slightly dark red color. Similarly, laser pulses are also positioned over the sub-pixels of yellow and magenta color so that personal data is printed on the document and a desired color effect is generated.

[0028] Printing of the personal data on the document creates a personalized document. As described earlier, the document comprises a pre-printed matrix of a plurality of categories of sub-pixels for personalizing the document with a personal data. Further, the pre-printed matrix further comprises a plurality of categories of positioning marks, such that each category of positioning marks is associated with a respective category of sub-pixels. In an example, at least one positioning mark from each of the plurality of categories of positioning marks can be printed on the document. In an implementation, if color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the respective category of sub-pixels. Further, the pre-printed matrix may be printed on a printable surface of the document. In an example, the printable surface may be a layer, say, a bottom layer or an intermediate layer, of the document.

[0029] Therefore, the document is personalized based on printing of the personal data on the printable surface of the document. For printing the personal data, for each color amongst the plurality of colors at least one positioning mark of a category of positioning marks from amongst the plurality of categories of positioning marks for a color assists in positioning one or more laser pulses on the plurality of sub-pixels of the color.

[0030] According to the present subject matter described above, the document is personalized based on categories of positioning marks for each color of the selected pixels resulting in accurate darkening of the selected sub-pixels. Therefore, the laser pulses or the laser shots appropriately overlap the matrix to print the personal data on the document by generating desired color effects, thereby avoiding false color rendering.

[0031] It should be noted that the description and figures merely illustrate the principles of the present subject matter. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the present subject matter and are included within its spirit and scope. Further, all examples

recited herein are principally intended expressly to be only for pedagogical purposes to aid the reader in understanding the principles of the present subject matter and the concepts contributed by the inventor(s) to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the present subject matter, as well as specific examples thereof, are intended to encompass equivalents thereof.

[0032] The manner in which documents are personalized has been explained in detail with respect to the Figures 1-4. While aspects of described document personalization can be implemented in any number of different computing systems, transmission environments, and/or configurations, the embodiments are described in the context of the following exemplary system(s).

[0033] Figure 1 schematically illustrates a printing system 102 for personalizing documents, in accordance with an embodiment of the present subject matter. The documents referred herein may include identity cards, passports, driving licenses, credit cards, and banking cards. Such documents may be created on a polycarbonate substrate, a polyethylene terephthalate (PET) substrate, a polyvinyl chloride (PVC) substrate and a laminated substrate.

[0034] As shown in Figure 1, the printing system 102 further comprises a printing device 104, a vision positioning device 106, and a personalization unit 108. The personalization unit 108 further includes a sub-pixel selection unit 110 and a laser positioning unit 112. In an implementation, the printing system 102 may be an offset printing device.

[0035] According to the present subject matter, the printing device 104 prints a matrix comprising a plurality of categories of sub-pixels. Each of the plurality of categories of sub-pixels includes a plurality of sub-pixels. In one implementation, the plurality of categories of sub-pixels may be indicative of a color combination of at least three colors. In one example, the color combination may be a Red-Green-Blue (RGB) color combination. In another example, the color combination may be a Yellow-Magenta-Cyan (YMC) color combination. For instance, the matrix can include three categories of sub-pixels, such that first category of sub-pixels is indicative of a cyan color, i.e., the sub-pixels of that category are of cyan color, second category of sub-pixels is indicative of a yellow color, and third category of sub-pixels is indicative of a magenta color. Further, the shape of the sub-pixels may be in form of dots, line or any other shape. In an implementation, the design of the matrix to be printed can be prepared using a known computer-aided design (CAD) technique.

[0036] In one implementation, the printing device 104 further prints a plurality of categories of positioning marks. The plurality of categories of positioning marks is printed such that the categories of positioning marks are printed in proximity to the matrix. Each of the plurality of categories of the positioning marks is of a different color. Further, each category of positioning marks may include one or more positioning marks. In said implementation, each of the plurality of categories of positioning marks may be associated with a respective category of sub-pixels from amongst a plurality of categories of sub-pixels. In an implementation, if the color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the respective category of sub-pixels. For instance, if a matrix includes three categories of sub-pixels of cyan, yellow, and magenta color respectively, then three of categories of positioning marks, one for each color, are printed in proximity to the matrix. For example, for a category of sub-pixels of cyan color, a category of positioning marks representing a cyan color is printed inside the matrix.

[0037] In one implementation, the plurality of categories of positioning marks may be represented by different shapes including a cross shape, a T-shape, a bar shape, and a target shape. The plurality of categories of positioning marks is used for locating the categories of sub-pixels and positioning laser pulses on the categories of sub-pixels. For example, a category of sub-pixels of a color can be located with the help of category of positioning marks representative of that color. Although, it has been described that the printing device 104 prints the plurality of categories of positioning marks in proximity to the matrix, i.e., outside the matrix, however, in another implementation, the printing device 104 prints the plurality of categories of positioning marks inside the matrix, such that the matrix comprises the plurality of categories of sub-pixels and the plurality of categories of positioning marks. The manner in which the printing device 104 prints the matrix comprising the plurality of categories of sub-pixels and the plurality of categories of positioning marks positioning marks is described henceforth.

[0038] According to an implementation of the present subject matter, the printing device 104 prepares a plurality of printing plates to print the plurality of categories of sub-pixels and the plurality of categories of the positioning marks, associated with the plurality of categories of sub-pixels, on the document. In an implementation, the printing device 104 prepares the plurality of printing plates, one for each category of sub-pixels and each category of positioning marks, associated with the category of sub-pixels. For instance, the printing device 104 prepares a first printing plate for a first category of sub-pixels and a first category of positioning marks, associated with the first category of sub-pixels. Similarly, the printing device 104 prepares a second printing plate for a second category of sub-pixels and a second category of positioning marks, and so on.

[0039] In one implementation, the printing device 104 loads the plurality of printing plates into the printing system 102 and thereafter, the printing device 104 positions the plurality of printing plates, one by one, on the document to print each category of sub-pixels and each cat-

egory of positioning marks with the corresponding category of sub-pixels to create the pre-personalized document. In one implementation, the printing device 104 aligns the printing plates at a pre-defined gap, corresponding to the gap between two sub pixels. Further, the printing device 104 prints the plurality of categories of sub-pixels and the plurality of categories of positioning marks with a level of tolerance substantially ranging from 10 to 50 microns. In an implementation, the plurality of categories of sub-pixels and the plurality of categories of positioning marks may be printed using conventional preparation techniques, such as a computer-to-plate (CTP) technique or a computer-to-film (CTF) technique.

[0040] Although, it has been described that the printing device 104 prints the plurality of categories of sub-pixels and the plurality of categories of positioning marks simultaneously, however, in another implementation, the printing device 104 may first print the plurality of categories of sub-pixels and then print the plurality of categories of positioning marks.

[0041] According to an implementation, matrix comprising the plurality of categories of sub-pixels and the plurality of categories of positioning marks may be preprinted on a printable surface of the document. In another implementation, the matrix comprising the plurality of categories of sub-pixels and the plurality of categories of positioning marks may be printed inside a substrate of the document, i.e., in one of printable layers of the substrate. The manner in which the personalization of document using the above described matrix takes place is described henceforth.

[0042] According to an implementation, the sub-pixel selection unit 110 of the personalization unit 108 obtains a personal data, from a user, to be printed on the document. The personal data comprises a representation of the user. The representation of the user may be a name, a photograph, a signature, an image, such as a photograph, etc. In an example, the personal data may be created in a Bitmap (BMP) file format or in a Joint Photographic Experts Group (JPEG) file format, or any image file format. To accurately print the personal data on the document, the personal data should appropriately overlap the matrix to generate desired color effects and the personal data.

[0043] Further, the sub-pixel selection unit 110 selects a plurality of sub-pixels from each of the plurality of categories of sub-pixels from the matrix comprising the plurality of categories of sub-pixels. In one implementation, the sub-pixels selection unit 110 selects the plurality of sub-pixels from each category of sub-pixels, one by one, based on the personal data. As described earlier, the plurality of categories of sub-pixels may be indicative of a color combination of at least three colors. For instance, the color combination may be a Red-Green-Blue (RGB) color combination. In another instance, the color combination may be a Yellow-Magenta-Cyan (YMC) color combination.

[0044] In an example, the sub-pixel selection unit 110 selects a plurality of sub-pixels from a category of sub-pixels that is indicative of cyan color first. Thereafter, the sub-pixel selection unit 110 selects a plurality of sub-pixels from a category of sub-pixels that is indicative of yellow color and finally the sub-pixel selection unit 110 selects a plurality of sub-pixels from a category of sub-pixels indicative of magenta color. In an implementation, the matrix may be a dot matrix or a line matrix. For instance, if the shape of the sub-pixels is in form of dots, then the matrix is a dot matrix. If the shape of the sub-pixels is in form of lines, then the matrix is a line matrix.

[0045] According to an implementation, the vision positioning device 106 captures each of the plurality of categories of positioning marks. In an implementation, the vision positioning device 106 captures each of the plurality of categories of positioning marks, one by one, based on the selected plurality of sub-pixels. For example, if plurality of sub-pixels from a category of sub-pixels that is indicative of a cyan color is selected, then the vision positioning device 106 captures the category of positioning marks that represents cyan color. In an implementation, the vision positioning device 106 captures a category of positioning marks that is associated with the respective category of sub-pixels. In an implementation, if the color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the respective category of sub-pixels.

[0046] The vision positioning device 106 includes camera that captures the plurality of categories of positioning marks. The plurality of categories of positioning marks assists in positioning one or more laser pulses over the selected plurality of sub-pixels. The camera captures a category of positioning marks that is associated with the selected plurality of sub-pixels of the category of sub-pixels. In an example, if the plurality of sub-pixels is selected from a category of sub-pixels that is indicative of cyan color, then the vision positioning device 106 captures the category of positioning marks that represents cyan color for precise placement of the laser pulses over the selected plurality of sub-pixels.

[0047] Figure 2 illustrates an exemplary matrix 200 of three categories of sub-pixels and three categories of positioning marks printed in proximity to the matrix, in accordance with an embodiment of the present subject matter. In one implementation, each of the three categories of sub-pixels and each of the three categories of positioning marks are indicative of a unique color. As shown in figure 2, each of the three categories of sub-pixels includes a plurality of sub-pixels of dot shape. The sub-pixel 202 represents red colored sub-pixel, sub-pixel 204 represents blue colored sub-pixel, and sub-pixel 206 represents green colored sub-pixel. Further, as shown in figure 2, each of the three categories of positioning marks includes four positioning marks and is printed in proximity to the matrix 200, i.e., near corner of the matrix 200. Further, the pattern of each of the three categories of positioning marks is different for different colors and

the shape of each category of positioning marks is different from the shape of each category of sub-pixels. As shown in figure 2, positioning mark 208 represents a red colored positioning mark and it is a cross-shaped. Positioning mark 210 represents a blue colored positioning mark and it is bar-shapes. Further, positioning mark 212 represents green colored positioning mark. As can be seen in figure 2, for each color, four positioning marks are printed near each corner of the matrix 200.

[0048] According to an implementation, the laser positioning unit 112 positions one or more laser pulses, say laser pulses of known Neodymium-doped Yttrium Aluminum Garnet (Nd: YAG) laser or a carbon dioxide (CO_2) laser over the selected plurality of sub-pixels of a category of sub-pixels based on a category of positioning marks that is associated with the selected plurality of sub-pixels of the category of sub-pixels. Similarly, the laser positioning unit 112 positions one or more laser pulses for the remaining categories of sub-pixels, one by one. In an implementation, the laser pulses are positioned from a distance of 100 millimeter to 200 millimeter. The distance is the focus distance, i.e., equivalent to distance between F-theta lens of galvo head of the laser and a surface of the substrate to be laser marked. When the laser pulses are positioned on the selected sub-pixels, the laser shots appropriately darken the selected sub-pixels based on the personal data to generate a desired color effect and the personal data is printed on the document.

[0049] As described earlier, the document may be created on the polycarbonate substrate. As the polycarbonate material is laser reactive, the carbon particles react and turn black when exposed to the laser pulses. In an example, laser pulses of range 266 nm, 532 nm, 1064 nm, and/or 10640 nm can be positioned over the sub-pixels to darken them. The number of laser pulses may depend on the size and the shape of the sub-pixels in the matrix. For instance, if the matrix is made of dot shaped sub-pixels of size 80 micron diameters, then four laser pulses are used to completely overlap the sub-pixels. In another instance, if the matrix is made of line shaped sub-pixels of size 80 micron diameters, then two laser pulses are used on top of each other to correctly blacken the width of the sub-pixels.

[0050] In an implementation, the coverage area of a laser pulse varies according to the physical set up of the laser. The physical set up is mainly linked to the focus distance of the laser, i.e., distance between F-theta lens of galvo head of the laser and a surface of the substrate on which the personal data is to be created.

[0051] The sub-pixels of the matrix that are not blackened are perceived as sub-pixels of a new color. For instance, in matrix of cyan, yellow, and magenta colored sub-pixels, if the laser pulses are positioned over the sub-pixels of cyan color, then the sub-pixels of cyan color turn black. The remaining colors in the matrix, i.e., yellow, magenta, and black are perceived as slightly dark red color. Similarly, laser pulses are also positioned over the sub-pixels of yellow and magenta color so that personal data is printed on the document and a desired color effect is generated.

[0052] Printing of the personal data on the document creates a personalized document. As described earlier, the document comprises a pre-printed matrix of a plurality of categories of sub-pixels for personalizing the document with a personal data. Further, the pre-printed matrix further comprises a plurality of categories of positioning marks, such that each category of positioning marks is associated with a respective category of sub-pixels. In an example, at least one positioning mark from each of the plurality of categories of positioning marks can be printed on the document. In an implementation, if color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the respective category of sub-pixels. Further, the pre-printed matrix may be printed on a printable surface of the document. In an example, the printable surface may be a layer, say, a bottom layer or an intermediate layer, of the document.

[0053] Therefore, the document is personalized based on printing the personal data on the printable surface of the document, where, for printing the personal data, for each color amongst the plurality of colors at least one positioning mark of a category of positioning marks from amongst the plurality of categories of positioning marks for a color assists in positioning one or more laser pulses on the plurality of sub-pixels of the color.

[0054] Since the document is personalized based on categories of positioning marks for each color of the selected pixels resulting in accurate darkening of the selected sub-pixels. Therefore, the laser pulses or the laser shots appropriately overlap the matrix to print the personal data on the document by generating desired color effects, thereby avoiding false color rendering.

[0055] Figure 3a illustrates an exemplary matrix used for personalizing a document by a conventional system. As shown in figure 3a, a matrix 302 is used for personalizing the document. The matrix 302 includes three categories of sub-pixels indicative of red color, blue color and green color, respectively. A positioning mark 304 is located near a corner of the matrix 302. The positioning mark 304 represents a red colored positioning mark. As can be seen in figure 3a, positioning mark of only red color is located near the corner of the matrix 302. When the laser pulses are positioned over the sub-pixels of the matrix 302 using the positioning mark 304, the sub-pixels of green and blue color are not covered properly. Since positioning mark 304 of only red color is located near the matrix 302, the laser pulses are not aligned properly on the sub-pixels, thus resulting in false color rendering. Further, since sub-pixels of blue and green color are not covered properly, personal data is inappropriately created on the personalized document 306.

[0056] Figure 3b illustrates an exemplary matrix used for personalizing the document by present printing system 102. As shown in figure 3b, the matrix 312 includes

a plurality of sub-pixels of red, blue and green color and positioning marks 314, 316, and 318 of each of the red, blue, and green color are located near a corner of the matrix 312. Since positioning marks are used of all the three colors, the sub-pixels are appropriately covered, thus avoiding false color rendering. As can be seen in figure 3b, personal data is appropriately created on the personalized document 320.

[0057] Figures 4a and 4b illustrate a method for creating a pre-personalized document and for personalizing the pre-personalized document, in accordance with an embodiment of the present subject matter. The order in which the method 400 is described is not intended to be construed as a limitation. Additionally, some of the individual blocks may be deleted from the method 400 without departing from the spirit and scope of the subject matter described herein. Furthermore, the method 400 can be implemented in any suitable hardware, software, firmware, or combination thereof.

[0058] The method 400 may be described in the general context of computer executable instructions. Generally, computer executable instructions can include routines, programs, objects, components, data structures, procedures, modules, functions, etc., that perform particular functions or implement particular abstract data types.

[0059] At block 402, the method 400 includes printing a matrix on a document to create a pre-personalized document, where the matrix comprises a plurality of categories of sub-pixels and a plurality of categories of positioning marks. Each category of sub-pixels includes a plurality of sub-pixels. Further, each category of sub-pixels and each category of positioning marks are of a different color. For instance, the plurality of categories of sub-pixels may include at least a first category of sub-pixels of a first color and a second category of sub-pixels of a second color. In said instance, the first category of sub-pixels is printed with at least one positioning mark in relation with the first color and then the second category of sub-pixels is printed with at least one positioning mark in relation with the second color.

[0060] In an implementation, the plurality of categories of sub-pixels and positioning marks is printed using a plurality of printing plates. The printing plates are positions on a document to create the pre-personalized document. In an example, a first printing plate may be prepared for a first category of sub-pixels and a first category of positioning marks. Similarly, a second printing plate, identical to the first printing plate, is prepared for a second category of sub-pixels and a second category of positioning marks and so on.

[0061] At block 404, the method 400 includes obtaining a personal data to be created on the pre-personalized document. The personal data comprises a representation of the user. The representation of the user may be a name, a photograph, a signature, an image, such as a photograph, etc. According to an implementation, the sub-pixel selection unit 110 obtains the personal data from a user to be created on the document.

[0062] At block 406, the method 400 includes selecting, based on the personal data, a plurality of sub-pixels from a category of sub-pixels from amongst the plurality of categories of sub-pixels. As described earlier, the plurality of categories of sub-pixels may be indicative of a color combination of at least three colors. For instance, the color combination may be a Yellow-Magenta-Cyan (YMC) color combination. Therefore, in an example, a plurality of sub-pixels from a category of sub-pixels that is indicative of cyan color may be selected. In an implementation, the sub-pixel selection unit 110 selects a plurality of sub-pixels from a category of sub-pixels from amongst the plurality of categories of sub-pixels.

[0063] At block 408, the method 400 includes capturing a category of positioning marks, where the category of positioning marks is associated with the category of sub-pixels. In an implementation, the category of positioning marks may be selected based on the selected plurality of sub-pixels from the category of sub-pixels. If the color of a category of positioning marks is same as that of a category of sub-pixels, then the category of positioning marks is said to be associated with the respective category of sub-pixels. For example, if plurality of sub-pixels from a category of sub-pixels that is indicative of a cyan color is selected, then the category of positioning marks that represents cyan color is captured. In an implementation, a camera of a vision positioning device 106 may be used to capture a category of positioning marks.

[0064] At block 410, the method 400 includes positioning one or more laser pulses on the selected plurality of sub-pixels based on the category of positioning marks. In an implementation, one or more laser pulses, say laser pulses of known Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) laser or a carbon dioxide (CO_2) laser are positioned over the selected plurality of sub-pixels of based on the category of positioning marks that is associated with the selected plurality of sub-pixels of the category of sub-pixels. The plurality of categories of positioning marks assists in positioning one or more laser pulses over the selected plurality of sub-pixels. According to an implementation, the laser positioning unit 112 positions one or more laser pulses on the selected plurality of sub-pixels based on the category of positioning marks.

[0065] At block 412, the method 400 includes creating the personal data on the pre-personalized document to personalize the document. When the one or more laser pulses are positioned over on the selected plurality of sub-pixels, the laser shots appropriately darken the selected sub-pixels based on the personal data to generate a desired color effect and the personal data is printed on the document.

[0066] According to an implementation, the method blocks 406, 408, and 410 described above are repeated for each of the plurality of categories of sub-pixels. Therefore, the document is personalized based on categories of positioning marks for each color of the selected pixels resulting in accurate darkening of the selected sub-pix-

els. Therefore, the laser pulses or the laser shots appropriately overlap the matrix to print the personal data on the document by generating desired color effects, thereby avoiding false color rendering.

[0067] Although implementations for personalizing the document have been described in language specific to structural features and/or methods, it is to be understood that the appended claims are not necessarily limited to the specific features or methods described. Rather, the specific features and methods are disclosed as examples of systems and methods for personalizing the document.

Claims

1. A document comprising a pre-printed matrix of a plurality of categories of sub-pixels for personalizing the document with a personal data, wherein the pre-printed matrix further comprises a plurality of categories of positioning marks, and wherein each category of positioning marks is associated with a respective category of sub-pixels.

2. The document as claimed in claim 1, wherein each category of sub-pixels is indicative of a unique color.

3. The document as claimed in claims 1 or 2, wherein the plurality of categories of sub-pixels is indicative of a color combination of at least three colors, wherein the color combination is one of a Yellow-Magenta-Cyan (YMC) color combination and a Red-Green-Blue (RGB) color combination.

4. The document as claimed in claim 1, wherein the personal data comprises a representation of a user.

5. The document as claimed in claim 1, wherein the document is one of an identity card, a passport, a driving license, a credit card, and a banking card.

6. The document as claimed in any one of the preceding claims, wherein the document is created on a polycarbonate substrate.

7. The document as claimed in claim 1, wherein the plurality of categories of positioning marks is printed inside the pre-printed matrix.

8. The document as claimed in claim 1, wherein the plurality of categories of positioning marks is printed outside the pre-printed matrix.

9. The document as claimed in claim 1, wherein the plurality of categories of positioning marks is represented by different shapes including a cross shape, a T-shape, a bar shape, and a target shape.

10. The document as claimed in claim 1, wherein each category of positioning marks is of a different color.

11. The document as claimed in claim 10, wherein color of each category of positioning marks is associated with a respective category of sub-pixels.

12. A printing system (102) for pre-personalizing a document, the printing system (102) comprising a printing device (104) to print a matrix comprising a plurality of categories of sub-pixels, wherein the printing device (104) further prints a plurality of categories of positioning marks, and wherein each category of positioning marks is associated with a respective category of sub-pixels.

13. The printing system (102) as claimed in claim 12, wherein the printing system (102) is an offset printing device.

14. A method for creating a pre-personalized document, the method comprising:

    printing a matrix of a plurality of categories of sub-pixels on a document; and
    printing a plurality of categories of positioning marks on the document to create the pre-personalized document, wherein each category of positioning marks is associated with a respective category of sub-pixels.

15. The method as claimed in claim 14, wherein the plurality of categories of sub-pixels include at least a first category of sub-pixels of a first color and a second category of sub-pixels of a second color, and wherein the first category of sub-pixels is printed with at least one positioning mark in relation with the first color and then the second category of sub-pixels is printed with at least one positioning mark in relation with the second color.

16. The method as claimed in claim 14, wherein the each category of positioning marks is of a different color.

17. The method as claimed in claim 14 further comprising:

    preparing a first printing plate for a first category of sub-pixels and a first category of positioning marks;
    preparing a second printing plate identical to the first printing plate for a second category of sub-pixels and a second category of positioning marks; and
    positioning the first printing plate and the second printing plate, one by one, on the document to be pre-personalized to print each category of sub-pixels and the each category of positioning marks with corresponding category of sub-pix-

els.

18. The method as claimed in claim 17, wherein the first printing plate and the second printing plate are aligned at a pre-defined gap.

19. The method as claimed in claim 14, wherein the plurality of categories of sub-pixels and the plurality of categories of positioning marks are printed with a level tolerance substantially ranging from 10 to 50 microns.

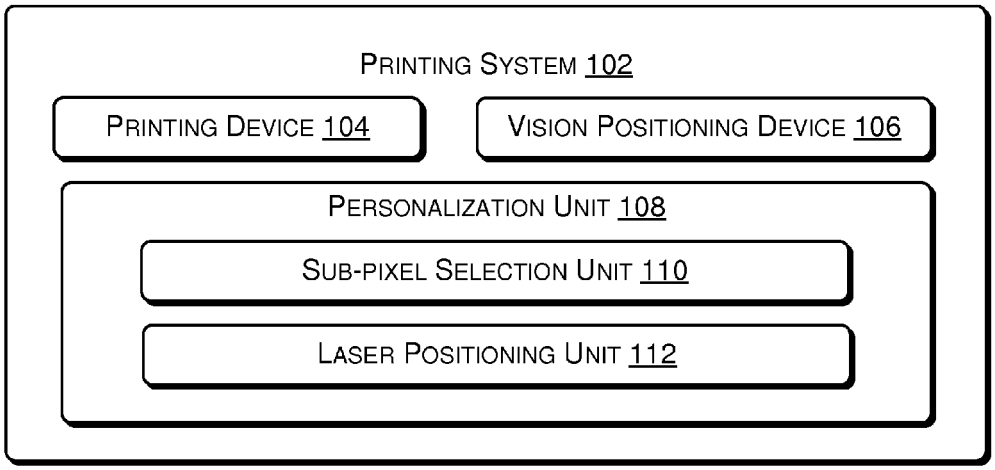
PRINTING SYSTEM 102
PRINTING DEVICE 104
VISION POSITIONING DEVICE 106
PERSONALIZATION UNIT 108
SUB-PIXEL SELECTION UNIT 110
LASER POSITIONING UNIT 112

Figure 1

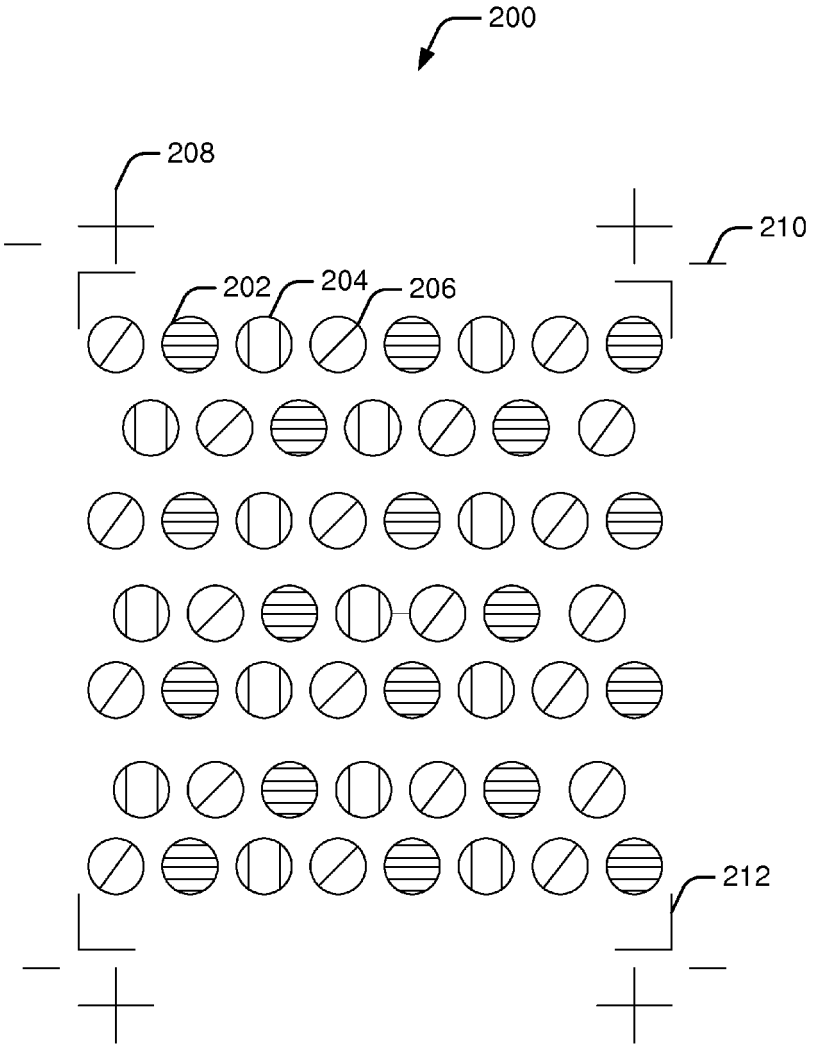

Figure 2

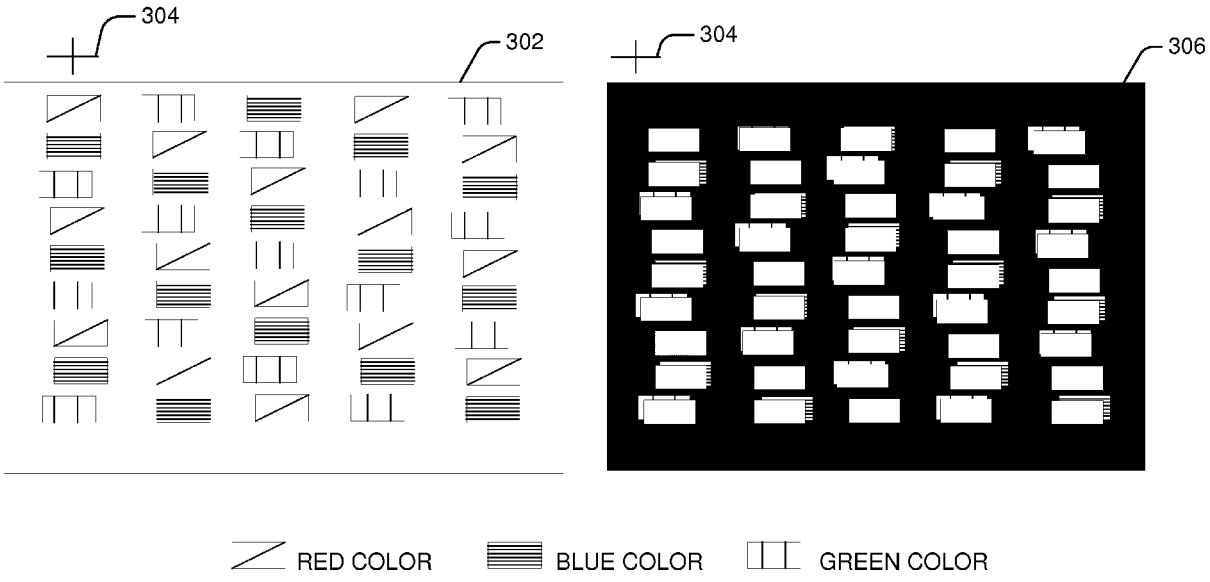

Figure 3a

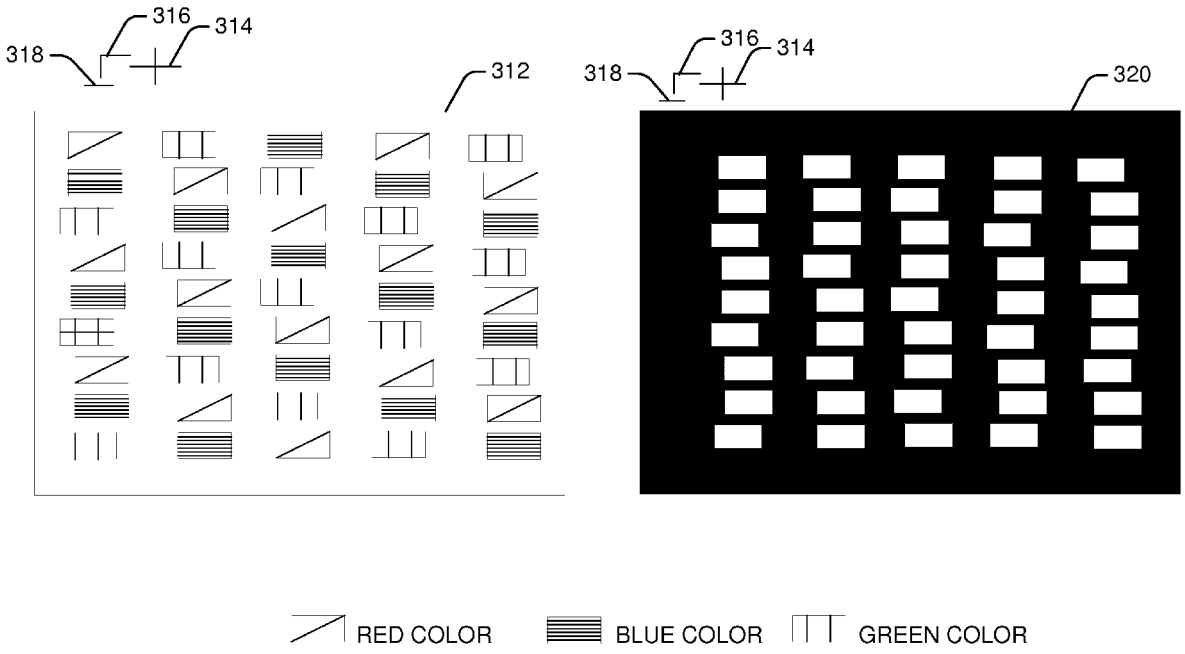
316
314
318
312
316
314
318
320
RED COLOR
BLUE COLOR
GREEN COLOR

Figure 3b

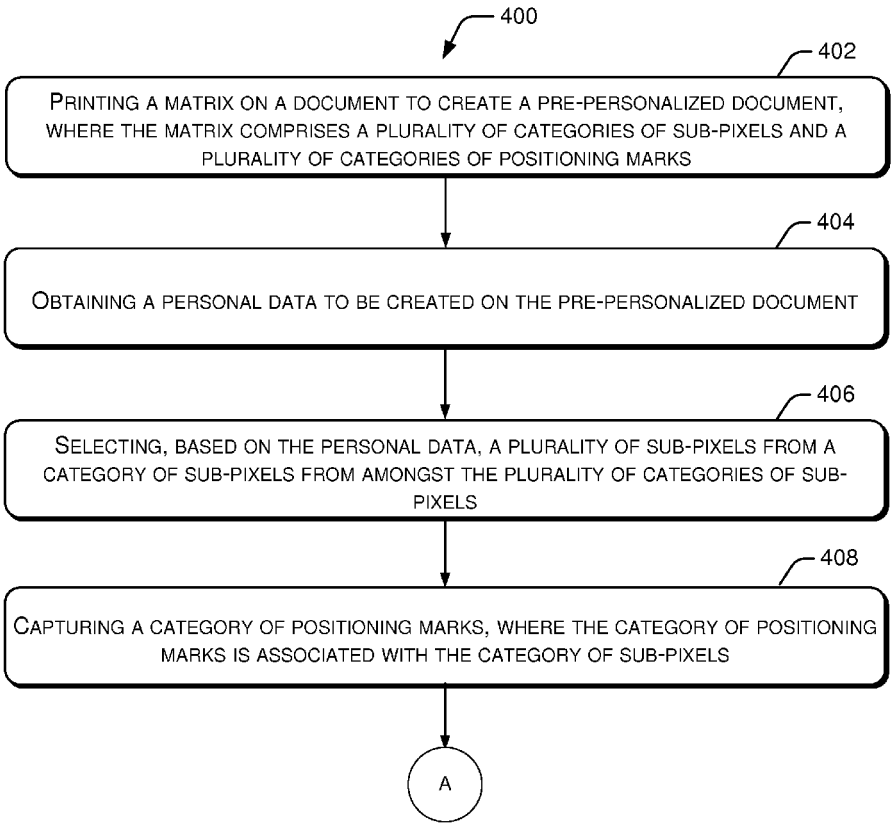
400
402
PRINTING A MATRIX ON A DOCUMENT TO CREATE A PRE-PERSONALIZED DOCUMENT, WHERE THE MATRIX COMPRISES A PLURALITY OF CATEGORIES OF SUB-PIXELS AND A PLURALITY OF CATEGORIES OF POSITIONING MARKS
404
OBTAINING A PERSONAL DATA TO BE CREATED ON THE PRE-PERSONALIZED DOCUMENT
406
SELECTING, BASED ON THE PERSONAL DATA, A PLURALITY OF SUB-PIXELS FROM A CATEGORY OF SUB-PIXELS FROM AMONGST THE PLURALITY OF CATEGORIES OF SUB-PIXELS
408
CAPTURING A CATEGORY OF POSITIONING MARKS, WHERE THE CATEGORY OF POSITIONING MARKS IS ASSOCIATED WITH THE CATEGORY OF SUB-PIXELS
A

Figure 4a

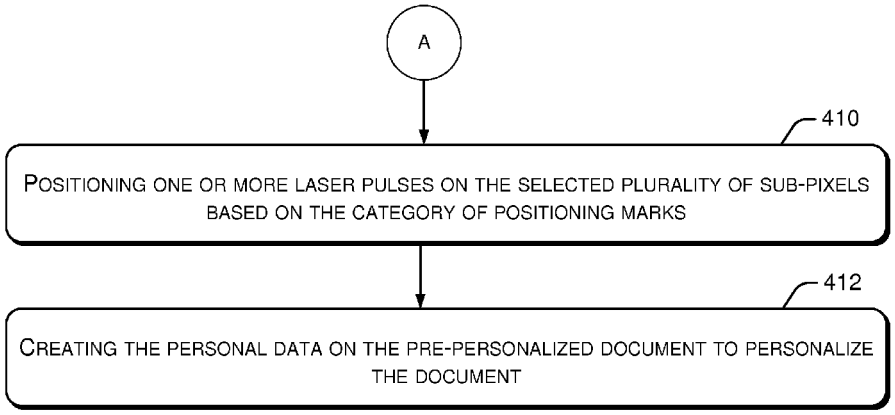
A
410
POSITIONING ONE OR MORE LASER PULSES ON THE SELECTED PLURALITY OF SUB-PIXELS BASED ON THE CATEGORY OF POSITIONING MARKS
412
CREATING THE PERSONAL DATA ON THE PRE-PERSONALIZED DOCUMENT TO PERSONALIZE THE DOCUMENT

Figure 4b

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EUROPEAN SEARCH REPORT

Application Number
EP 13 17 8094

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			B42D B41J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 December 2013	Langbroek, Arjen

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